Session 4 : Customer Satisfaction Through ICT

Presenter

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Topic : Issues and Challenges in Providing Quality ICT Infrastructure Service Delivery in a University Campus Environment

Issues and Challenges in Providing Quality ICT Infrastructure Service Delivery in a University Campus Environment

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Abstract

Within a university environment, Information and Communication Technology (ICT) has become an important enabler in disseminating and sharing of knowledge through teaching, learning, research and supporting services to the core business. Thus, in this era, it is important that the body responsible for delivering the ICT services within a university campus reorientate the mode of delivery to that of a service provider. Based on this, the Centre for ICT (CICT) at the Universiti of Teknologi Malaysia sets the goal to achieve level three within the IT Management Process Maturity Model (Gartner Research, 2004). In this level, the IT organisation is supposed to define the service classes, the price associated with each classes and how to guarantee the service level as agreed upon. Traditional ICT service delivery is very much reactive and chaotic in nature. To migrate to this level, three tightly coupled components and issues, which relate to these components need to be addressed properly. The three components are technology, processes and people. How the three components relate to the ICT infrastructure strategic map and what are the issues and challenges will be deliberated and discussed in this paper.

Introduction

The rapid development in Information and Communication Technology (ICT) has impacted the way we interact and manage our lives. ICT has become a utility, which needs to be managed to assist core business of an organisation in achieving the mission and vision of that particular organisation. Business driven IT Management is defined as "*the application of a set of models, practices, techniques and tools to map and to quantitatively evaluate dependencies between IT solutions and business performance and using the quantified evaluation to improve the IT solutions' quality of service and related business results.*"[J. Sauvé et. al, 2006]. Thus, in order to deliver quality of ICT services to a particular organisation, the proper model, processes and related technology need to be studied to map to the actual business of the organisation.

Many misgivings occur when technology providers tries to propose their solutions to institutions of higher learning, which very much differ from commercial institutions, where even institutions of higher learning are unique to each other. Based on the comparison between campus and company environment, the organisation, process and technology model of campus IT service management have been proposed and implemented for some Chinese Universities in China [W. Zhen, Z. Xin-yu, 2007]. Though the basic mission of all universities is to perpetuate growth through knowledge sharing and creation, augment discovery and enhance creativity, the emphasis, culture and background are all different which makes service delivery to individual university to be unique. The impact of cultural conflict on service delivery has been studied and has to be factored in when developing the proper framework. [S. Jia, X. Geng, 2006]

This paper looks into the issues and challenges faced by the campus ICT infrastructure service provider in delivering quality

service delivery to the customers and end users. This is covered in section III. Section IV describes the strategic plans and initiatives to deliver the required quality services. Results and discussion is elaborated in section V followed by concluding remarks in section VI. The following section describes the current business service model involving direct customers and end users.

UTM ICT Service Hierarchy and Delivery Model and Relationship

The IT services which directly deals with teaching and learning, research and consultancy form part of the academic computing services provided by the university. The group, which constitutes the academic computing community, are the students, lecturers and researchers whilst the business units responsible are the faculties, the research institutes and Centres of Excellence (COE), Centre for Teaching and Learning (CTL), and the library (Perpustakaan Sultanah Zanariah). The administrative computing services consist of IT services deployed for administrative units of the university to administer and manage the running of the core business. Typical applications include the Human Resource and Financial applications and Student Management System. Other system includes Research Management System and Asset Management System. It is incumbent that the system deployed (e-learning, on-line knowledge services, informational repositories) captures the actual business processes and translate it to help the university achieves its goal and mission. The underlying layer is the university ICT infrastructure to help drive both the academic and administrative computing services. Within the wider context, Business Driven IT Management should be able to assist the university top management gauge the impact of IT on the business. Business strategies, which constitute individual ICT business plans, should be carefully aligned with the individual ICT plans within the functional and operational strategies to produce overall quality ICT services. However, the scope of this paper is

only limited to quality service delivery of the ICT infrastructure, the foundation for other IT related services. It is also important to note that ICT infrastructure services in itself is dependent on other parties such as the external Internet Service Provide (ISP) which links university to the outside world and utilities such as electricity and air condition managed by the facility department of the university.

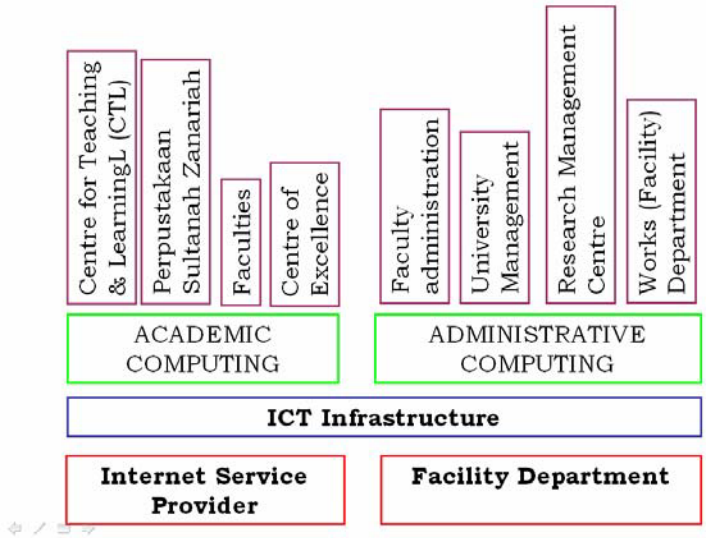

Figure 1 UTM ICT Service Hierarchy

To understand from an architectural point of view the factors affecting the service delivery, the components in the service delivery needs to be identified. There are three main components involved; the end users devices, the communication channel, which can either be wired or wireless and the third is the services being sought which typically, resides in a server. Figure 2 depicts the three integrated components.

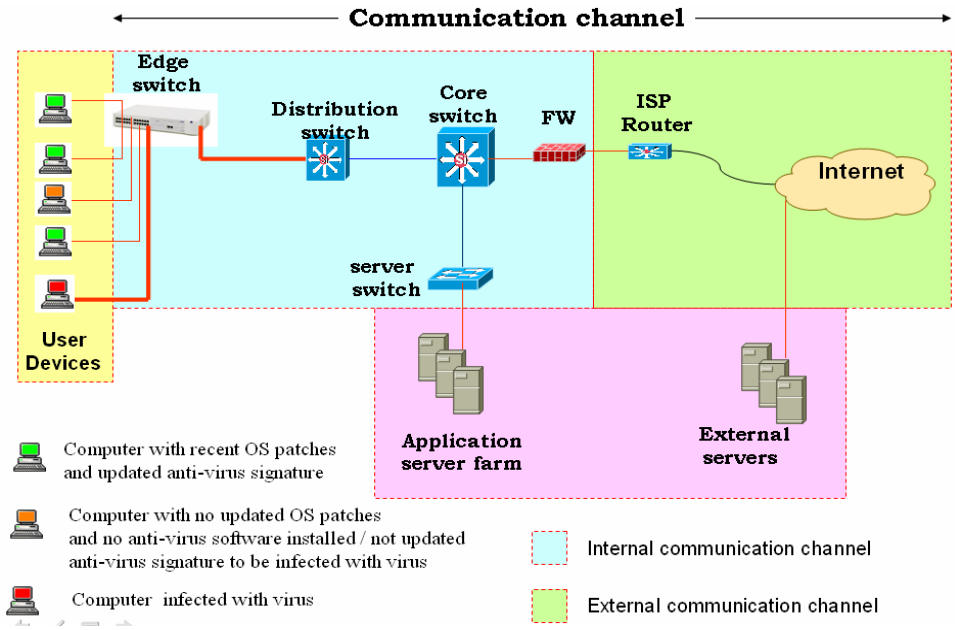

Figure 2 Components in the ICT Infrastructure Service Delivery

Issues and Challenges

Having identified the ICT service hierarchy and service delivery architecture, let us identify the issues related to quality service delivery and its challenges. One of the prime quality measures in ICT infrastructure service delivery is service availability. To the end users, the important thing is to be able to access the end destination, which provides the services (e-learning materials, on-line databases etc). Here the service provider is to provide the means of accessibility in whatever way possible taking into consideration the latest technology in end devices.

Availability can be defined in two ways, first the extend of coverage and second, the uptime of the services offered. The service accessibility has to be provided at anytime (or all the time), anywhere and by whatever means possible (anyhow). The extend of coverage is a policy of the university. Since the university has targeted that all the population of the university, including off campus students and staff can access on line information provided by the university, the ICT plans should incorporate this

requirement. The first challenge in providing this coverage is the considerable finance needed to deploy the services. This is followed by determining the right technology and approach to implement. If the planning and design is not done properly, then ultimately the service provider will meet with the situation where services are unavailable (down) for the provided (covered) services most of the time. The customer will then say that it is better not to provide the service.

Availability can be more properly defined as follows;

$$Availability = \frac{T_{op} - T_{down}}{T_{op}} ,$$

where T_{op} is the agreed service operation time and T_{down} is the (cumulative) service downtime. [Schaaf, 2007]. Based on this, from the users' perspective, availability has to be a sum measure of operational time of the user's end device, the communication channel and the destination services.

Thus cumulative availability,

$$Availability_{cum} = Availability_{end\ user} + Availability_{channel} + Availability_{end\ services}$$

A good understanding of the various factors, which influence operational availability of each component, has to be done especially at the design stage. Factors directly beyond the control of the Internal Service Provider (in this case CICT) have to be managed to ensure minimal disruption to the service.

Within the last years, the main causes of unavailability of services are denial of services caused by Internet worms and bad traffic generated from the user's computer, power failures causing the network equipment to fail and occasional hardware failures at the servers.

The rapid change in technology has caused a gap between end users' competency in handling their devices and the technology they adopt. A classic case is early adopters of Windows Vista who had certain protocols turned on which caused a considerable traffic to be generated. This degenerated the services to other users. For the service provider, the rapidly changing technology has also impacted the management of the ICT services wherein the limited resources of ICT personnel has to be constantly retrained to ensure their competencies is in pace with technology.

In general the nature of ICT service management has always been reactive and firefighting. This nature has been characterised by existence of multiple help desks, which makes resolution to incidences time consuming, untraceable and impedes improvement. This phenomenon is further compounded by ICT units acting in silos especially in resolving incidences and problems.

Strategic Plans and Initiatives towards Quality ICT Infrastructure Service Delivery

An ICT infrastructure strategic map based on Balanced Score Card was formulated to achieve the quality service delivery. As shown in figure 3 below, from the users' perspective, the primary measure of quality is service availability and services, which are provided with integrity and confidentiality. It is also the goal to ensure end users are well informed of any service unavailability and well trained to use the services provided. Well designed infrastructure services must be done to ensure reasonable service level, which in turn can be measured and be published to end users.

To complement these initiatives, proper process must be in place to overcome the ad-hoc and mostly reactive nature of ICT management. Since security is one of the important threats facing ICT services delivery, a standard ICT security code of practice must be adopted. In this case ISO27002 (formerly called

ISO17799), a code of practice for information security, officially titled "Information Technology - Security Techniques - Code of Practice for Information Security Management' is adopted. In addition a standard framework for IT Service Management, ITIL (IT Infrastructure Library) together with IT Service Management (ITSM) is adopted to ensure quality service delivery and service support. The latest information on ITIL is available from ***http://www.itil-officialsite.com***.

Human resource is the most important asset in a service delivery organisation. Sufficient and competent staffs are needed to ensure timely delivery of services. Unfortunately, an audit of the staff strength needs to be carried out to ensure the staff strength is optimum. The Skills Framework for the Information Age (SFIA - ***http://www.sfia.org.uk***) has been identified as a potential reference model for the identification of the necessary skills in ICT service delivery, support and management. More study needs to be done to customise this model to the Malaysian environment in the managing ICT for university.

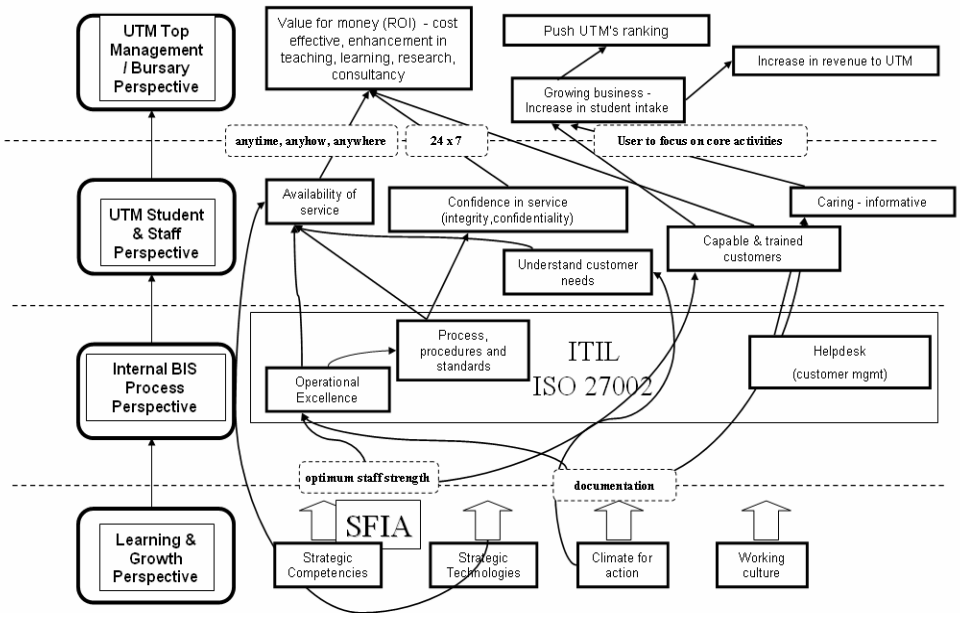

Figure 3 UTM ICT Infrastructures Strategic Map

Based on the strategic map, strategic initiatives were carried out. This included redesigning the network to ensure better availability through single hop network architecture with physical separation of the academic, administrative computing infrastructure and as well a separate one for the residential colleges' network. This is done to reduce the impact of power failures at the faculties and at the distribution. Mission critical application platform are redesigned with redundancies or in multiple active modes for high availability. To minimise risk due to dependency on ISP or external link, multiple ISP is deployed with defined service level agreements. These are proactive measures to enhance service delivery.

To minimise impacts and to react to incidences, a monitoring centre was established. The monitoring centre, named CCMC (an abbreviation for Command, Control and Monitoring Centre) was setup to monitor all services though a common area, to consolidate all silo-based activities and to react to incidences in a more coordinated manner. The establishment of CCMC is also to broadcast to users all incidences, the level of services attained for a particular service within a stipulated time frame, to improve service delivery through regular discussions on problems and to coordinate all changes. At the moment, an SMS system has been established where the operators are alerted through SMS when faults occur. However, this system needs further improvement by adding more services to monitor.

Results and Discussion

The initiatives are ongoing based on the plans initially formulated four years ago. The diagram below shows some snapshots of services monitored. Figure 4a shows the monitoring centre, which started operation in 2006. Figure 4b shows statistics of some services being monitored. There are many kind of services monitored which includes the application services, the network

services and infrastructure availability. Figure 4c shows a monitored service level availability for e learning in the year 2007. The statistic showed that the e-learning service availability was 98.7%. However this is not an end-to-end service availability (cumulative availability as defined before). We hope in future we can measure end-to-end service availability and other performance measures such as mean time to repair (MTTR) and mean time between failures (MTBF) as defined in [T. Schaaf, 2007]. We also have not carried out any comparison to study the impact of changes made before and after the initiatives as been done by other researches [S.H.C Chan, YH Chan, 2007]

Figure 4a Command Control Monitoring Centre (CCMC)

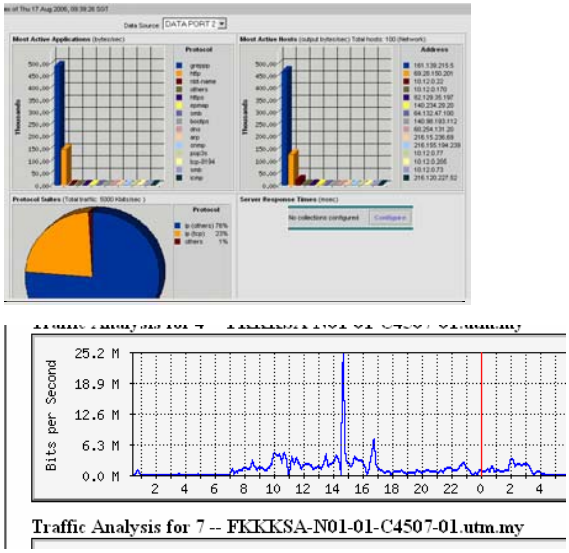

Figure 4b Sample statistics of services provided

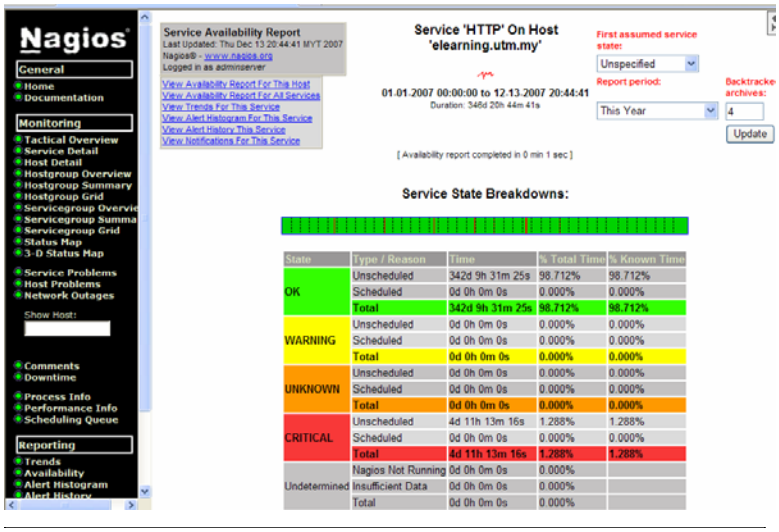

Figure 4c Monitored Service Level Availability for e learning (2007)

The initiatives will be continued and we hope to target to level three within the IT Management Process Maturity Model (Gartner Research, 2004) wherein proper service level agreement can be defined with the appropriate associated costs between the internal service provider and the end users and customers. Thus the belief that IT service is a strategic utility can be realised.

Conclusion

The paper has only deliberated on quality service delivery within the framework and scope of ICT infrastructure services. However quality ICT service delivery is more encompassing which covers the full hierarchy of ICT services which ties in closely with the business processes and activities. Further work needs to be done in this direction.

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Biodata

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